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# **A Cross Cultural Comparison of Long-Term Supply Relationships**

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**Theme G Cross-contextual comparison of institutes and organisations**

## **A Cross Cultural Comparison of Long-Term Supply Relationships**

### **Abstract**

This paper challenges the received view that long-term supply relationships are a typically Japanese feature, embedded and developed in a typically Japanese society characterized by high levels of trust and cooperation, and for that reason cannot be established in the typically a-cooperative, competitive and low trust Western world of the United States and Europe. Our results from the automobile industry show that (i) suppliers in all three continents are involved in durable relationships, and (ii) that the governance of these business relationships is by and large the same. The few differences that remain are interesting. In our interpretation they suggest that perhaps in the US a 'third way' of relationship management has been found. This 'third way' combines the advantages of sufficiently durable relations with the advantages of an open system with a variety of relations that benefits innovation. If our interpretation is correct the historical situation may have reversed: for the governance of durable relationships Japanese firms may now learn from U.S. firms.

## 1. INTRODUCTION

The received view on durable supply relationships is that they are a specifically Japanese feature, embedded and developed in a typically Japanese society characterized by high levels of trust, cooperation and interdependence (Dore, 1983; Hofstede, 1980; Smitka, 1991; Cusumano, 1985; Nishiguchi, 1994; Fruin, 1994; Dyer, 1997). Moreover, this form of industrial organization supposedly does work in Japan but not elsewhere in the world. Attempts by Western companies to imitate or copy Japanese business norms are costly and difficult because the way in which supply relationships developed in Japan is path-dependent i.e. they are enabled by the Japanese specific cultural features, politics, regulation, networks and corporate ethics. Smitka (1991), for example, argues that 'governance by trust' is more prevalent in the Japanese than in the U.S. automobile industry due to the existence of suppliers' associations in Japan and their absence in the U.S.

Despite the arguments above there is increasing evidence that Western firms successfully develop sustainable coalitions. In particular in the automobile industry producers have changed their short-term orientation with their suppliers towards more commitment, in more durable relationships (Clark, 1989; Sako, 1992; Helper, 1994). The present study seeks to understand and assess these developments in a new way, compared to earlier work on the same subject (Heide & John, 1990; Cusumano & Takeishi, 1991; Dyer & Ouchi, 1993; Sako and Helper, 1998; Kamath & Liker, 1994). The novelty of our contribution is twofold.

First, we take into account a variety of interlocking, and partly circular, causal relations between composite constructs of relationships. For example, one of the hypotheses, derived from transaction cost economics (TCE), is that dedicated investments increase dependence, and hence risk of hold-up. However, they can also increase one's unique value for the partner, thus increasing his dependence, which increases his commitment, which reduces hold-up risk. Further examples will emerge from our empirical analysis. To test our model we employ LISREL, which is an appropriate tool to analyze complex and sometimes circular patterns of causation.

Second, we include issues of ‘competence’ (learning and innovation) next to issues of ‘governance’. Williamson (1999) pleaded for the building of bridges between the competence and governance perspectives and we aim to contribute to that. More in particular, our analysis of long-term supply relationships is conducted on an interdisciplinary basis combining perspectives of governance with learning and innovation, and social exchange (trust and commitment) into a coherent model. The model incorporates a set of economic and non-economic motives that drive durable supply relationships.

We test our model with detailed information on 553, 450 and 226 supply relationships in the U.S., Japanese and European automobile industry. When comparing the results for the three regions we find differences that seem small, relative to the received views on systemic differences between ‘Japanese’ and ‘Western’ contracting. Our results indicate that in each of the three regions a common, underlying causal structure of durable relationships exists. Hence, suppliers in all three regions are involved in durables coalitions and the governance of these business relationships is by and large the same. This finding challenges the ‘embeddedness’ perspective according to which durable relationships are an exclusively Japanese phenomenon. However, from the empirical evidence we identify a few remaining differences between Japan and the West that may be important. Our interpretation is that they suggest that in the U.S. perhaps a ‘third way’ has been found (cf. Nooteboom, 1998). This ‘third way’ of relationship management combines the advantages of sufficiently durable relations with the advantages of an open system with a variety of relations that benefits innovation. If our interpretation is correct the historical situation may have reversed: for the governance of durable relationships Japanese firms may now learn from U.S. firms.

The structure of the paper is as follows. In section 2, we discuss the theoretical foundations for this study. Section 3 specifies the focal constructs and hypotheses. In section 4, we describe our research methodology, while we present our results in

section 5. We end with a discussion, limitations and further research issues in section 6.

## **2 THEORY**

### **2.1 Transaction cost economics**

Based on Williamson (1985) we employ some of the insights of transaction cost economics (TCE). More in particular we incorporate the notions of dedicated investments and the hold-up problem.

The transaction is the basic unit of analysis in TCE and each transaction shares costs. Furthermore, human nature ‘as we know it’ is characterized by opportunism (i.e. self-interest seeking with guile) and bounded rationality. TCE suggests that there are rational economic (i.e. efficiency) reasons for organizing some transactions this way and other transactions another. The different forms of governance are due to the different combinations of three principal dimensions for describing transactions: frequency of exchange, the level of specialized assets, and uncertainty. Asset specificity is the most important but it only takes on importance in conjunction with opportunism and bounded rationality, which follows from uncertainty. Specialized assets are the result of dedicated investments that are specifically undertaken in support of a particular transaction.

The market is the main governance structure for non-specific transactions of both occasional and recurrent transactions. However, the incentives for trading will weaken as transactions become increasingly more specific. Rational firms will not make dedicated investments unless the resulting transaction-specific assets can be safeguarded against the hazards of opportunism. Hence, the core insight from TCE is that dedicated investments create dependence, resulting in a risk of hold-up. Given the hazards of opportunism, this risk must be governed for which different mechanisms such as contracts and integration can be applied. To the extent that there is uncertainty concerning motives and conditions of collaboration, it is difficult to control risk by closed contingent contracts. High uncertainty will require other forms of bilateral governance such as hostages or vertical integration to control it. Vertical integration is

the most powerful mechanism because it gives the customer the best control and ability to monitor the supplier's behavior.<sup>1</sup> Later we will propose that also from the perspective of learning and innovation, the relevance of specific assets remains. In fact, we will argue that new categories of specific investments emerge.

Various scholars have argued that TCE is incomplete concerning innovation and learning and the role of non-economic, relational factors such as commitment and trust (Bradach & Eccles, 1989; Powel, 1990; Nooteboom, 2002). We consider trust and commitment to be important, because supposedly these features play a great role in Japanese contracting and we do not want to exclude them at forehand from the analysis. Hence, contrary to TCE (Williamson, 1993) we hypothesize that in the governance of long-term supply relationships trust and loyalty matters.

In our analysis of durable relations in the automobile industry innovation is important. Since the beginning of the 1980s, the automobile industry has gone through a period of rapid technological, commercial and organizational change. TCE, however, has little to say about the development of novel competencies. As Williamson (1985, p. 143) himself concluded: "...the study of economic organization in a regime of rapid innovation poses much more difficult issues than those addressed here". Later Williamson (1999, p. 1103) again argued that TCE "...makes only limited contact with the subject of learning", and proposed that bridges should be built between the competence and governance perspectives. The next section addresses this issue.

## 2.2 Competence theory

While TCE focuses on *static* efficiency –efficiency is maximized by trading off production costs, transaction costs and costs of organization, *given* a certain state of knowledge, technology and preference– we employ a perspective of *dynamic*

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<sup>1</sup> In this paper we neither study contracts (see the arguments in a later section) nor vertical integration. We analyze durable relationships between two interdependent but autonomous entities (cf. Fruin, 1992).

efficiency or innovation, incorporating *shifts* of knowledge, technology and preferences.

In many industries the current shift from ‘making’ to ‘buying’ is best explained on the basis of dynamic efficiency. In order to be at the forefront of development –and to maintain flexibility of configurations of competencies, for the sake of innovation– a producer should concentrate on the activities at which he is best and outsource the other activities as much as strategically possible. Furthermore, in order to reduce development times of new products and to reduce risks of maladjustment to customer needs, the supplier should be brought in as a partner in developing and launching a new product. Ongoing interaction between a customer and a supplier is a necessary condition in order to share and develop competencies.

By securing interfirm collaboration the resources of a firm can be refined and refocused. This will enhance knowledge-building and organizational competencies. In other words, durable relations are a basis for extending inter- and intrafirm capabilities because internal resources are increasingly connected with those of another enterprise.

The importance of complementary competencies is underpinned by a theory of knowledge. This theory suggests that people’s perceptions and interpretations are dependent on mental frameworks that in turn depend on idiosyncratic experience (Nooteboom, 2000). Those frameworks constitute absorptive capacity (Cohen & Levinthal, 1990). The need to create a common focus, in order to achieve common goals, is more fundamental for organizations than the need to reduce transaction costs. This is the idea of an organization as a ‘sense making system’ (Weick, 1995), a ‘focusing device’ (Nooteboom, 1992, 1999), or an ‘interpretation system’ (Choo, 1998). However, such organizational focus creates a risk of myopia, which needs to be repaired by employing complementary cognition from appropriate partners. Such complementary cognition must be at a ‘cognitive distance’ that is sufficiently large to yield novel insight and sufficiently small to ensure that it is still comprehensible.

Competencies are not off-the-shelf products but are embedded in the heads and hands of people, in teams, organizational structure and procedures, and in



organizational culture. They often have a strong tacit dimension. Their development is path-dependent in the sense that they are contingent upon preceding firm-specific assets and organizational learning (cf. Lippman & Rumelt, 1982). In the case of tacit knowledge, ongoing interaction is needed to enable the transfer of knowledge. The linkage between firms with different complementary perspectives and competencies requires appropriate absorptive capacity and a shared language for communication. This takes time to develop, on the basis of interaction, and represents a dedicated investment. For that reason business relations have to last a sufficiently long time to make the investment worthwhile.

In sum, from the competence view we take the idea that nowadays (i.e. under a regime of rapid innovations) inter-firm relations exist primarily for learning and for competence development. These arise by interaction, in the use of cognitive variety, which requires (dedicated) investments in mutual understanding.

### **2.3 Social exchange theory**

In line with other scholars that study interfirm relationships we argue that we need to consider not incidental and unrelated transactions as in transaction cost economics, but transactions in the setting of an exchange relationship that develops in time (Granovetter, 1985; Helper, 1987; Ring & Van de Ven, 1992; Sako, 1992; Gulati, 1995). Not the transaction –as in Williamson’s theory– but the relationship needs to be the unit of analysis. One reason for this was argued in the previous section: the need to develop and recoup dedicated investments in the building, exchange, absorption and utilization of complementary competences.

In addition to that, an important cause as well as a consequence of repeated interaction among firms is the emergence of commitment, as a basis for trust. Commitment is an important safeguard for relational continuity. A committed partner does not immediately exit from the relationship in case of (unforeseen) problems, but engages in ‘voice’ (Hirschman, 1979; Helper, 1987). Trust is a complex concept and because of space limitations it cannot be fully discussed here (for detailed discussions, see Gambetta, 1988; Kramer et al., 1996; Nooteboom, 2002).

Trust and commitment can have both a calculative and an affective basis. Commitment may result from habitualization (Gulati, 1995; Geyskens et al., 1996). Also, as a relationship develops, partners begin to know each other better, in the development of empathy, and can better assess the extent and limits of trustworthiness ('knowledge based trust'). Convergence of cognitive frameworks may arise, and this can lead to mutual identification ('identification based trust', cf. Lewicki & Bunker, 1996). Mutual identification means that partners can identify and understand each other's goals, weaknesses, and mistakes. They are able to engage in the give and take of voice. This not necessarily means that they always agree. There may be sharp disagreements, but those are combined with a willingness to express them and to discuss them more or less openly, while extending mutual benefit of the doubt. As a result, conflicts may deepen the relationship rather than breaking it.

Mutual openness is essential to the building of trust (Zand, 1972). An extensive communication system is necessary to facilitate the rich flow of information needed for the 'let's work things out' approach of the voice strategy. This information flow both requires and engenders a high degree of commitment to the relationship. The development of relation-specific trust also entails a specific investment. Having gone through it, one will face switching costs in going to another partner and having to go through it again. In contrast, an exit-based strategy requires low commitment, so as to maintain the credibility of the threat to leave.

This does not entail that relations should last endlessly. Indeed, relations can become too durable, with too much mutual identification and trust, yielding rigidities and lack of the variety that is needed for learning. In our view, relationships should last *sufficiently* long to recoup the investments necessary for high added value and learning by interaction, but not longer than that.

To summarize, from social exchange theory we incorporate the idea that trust is necessary and feasible, and that it can develop in mutual dependence, in growing mutual commitment.

## 2.4 Synthesis

An essential difference between TCE on the one hand and both the competence perspective and social exchange theory on the other hand is that the former only studies outcomes, which are supposedly efficient, while the latter look at processes, which may or may not lead to efficient outcomes. We take the competence perspective as our basic framework, supported by the constructivist theory of knowledge that we summarized. Thereby we put value of partners to each other, and perspectives for competence development, center stage. To this we add the insights of social exchange.

The competency perspective and social exchange theory are consistent in their process approach. In social exchange theory the development of trust fits well with the perspective of learning by interaction that we adopt as a basis for the competence approach. In the development of relations it is in our view crucial that partners *invest* in each other to utilize opportunities from complementary competencies, in joint competence development. This yields mutual dependence, which in turn creates commitment. These specific investments take on new forms. From the competence perspective they include investments in mutual understanding. From the social exchange perspective they include investments in the building of loyalty and trust. In line with TCE, we grant that there may be a relational risk of hold-up in such dedicated investments and this risk must be safeguarded.

According to TCE a contract is an important safeguarding mechanism and needs to be in place whenever dedicated investments are involved. Contracts reduce opportunities for opportunism. Therefore, TCE suggests studying the role of contracts in situation like ours that involve dedicated investments. In our view, however, contracts as safeguards have only limited viability. This derives from Macauley (1963) who already indicated the limited significance of contracts.

Firms involved in durable relations often use contracts. There will seldom be no contract at all. However, contracts may have several parts and may serve a variety of purposes. One purpose is technical i.e. to serve as a mere record to support memory, like the minutes of a meeting. In that case the content of a contract can be quite extensive in particular if the interface between business partners is technically

complex. Another purpose of a contract may be symbolic i.e. as the seal of a psychological rather than a legal contract, or as a ritual of agreement. This type of contract tends to be very limited in content. Finally, a contract may indeed have the purpose intended by transaction cost economics i.e. to safeguard against possible opportunism.

To find out what the role of a contract is, one cannot simply record whether a contract is in place. Nor is it sufficient to measure the size of the contract, since extensive contracts may have the purpose not of safeguarding against opportunism but as a record for technical coordination. In fact, contracts often lack the detailed contractual safeguards that transaction cost economics suggest. Such safeguards are inevitably incomplete, the more so to the extent that there is uncertainty and when innovation is the purpose of the relationship. It can be very costly to monitor contracts and to re-specify the content when circumstances change. Finally, contracts can be a source for mutual distrust when applied strictly to an agreement.

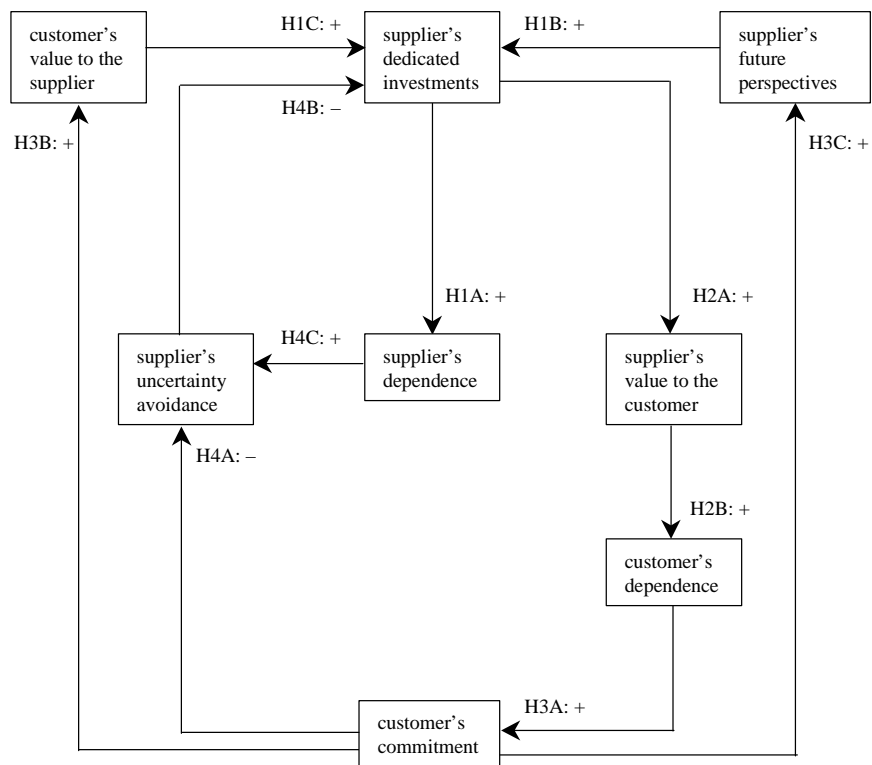
Hence, because of a lack of a relevant measure of contracts we do not include a hypothesis stating that dedicated investments lead to contracts for safeguarding. Nevertheless, the principle of safeguarding remains important but we will show that it can be achieved by other means than contracts.

Our main hypotheses are as follows:

- (1) From TCE: a positive effect of *dedicated investments* on *relational risk*, and a negative effect of *relational risk* on *dedicated investments*.
- (2) From the competence perspective: a positive effect of (potential) *value of the partner*, including *future perspectives* (for competence development), on *dedicated investments*, a positive effect of *dedicated investments* on *value to the partner*, and a positive effect of his *commitment* on his *value*.
- (3) From the social exchange perspective: a positive effect of one's *value to a partner* on his *dependence*, and of his *dependence* on his *commitment* (loyalty), and a negative effect of his *commitment* on *relational risk*.

The hypotheses are illustrated in figure 1, which is discussed in more detail in the next section.

FIGURE 1  
The Structural Model of Long-Term Supply Relationships



### 3 THE STRUCTURAL MODEL

This section embeds our key constructs and hypotheses in the empirical literature on interorganizational relationships.

#### 3.1 Constructs

*Dedicated investments*, as a core concept of transaction cost economics, has been extensively employed in empirical research on transaction-cost explanations of vertical integration (e.g. Monteverde & Teece, 1982; Levy, 1984; Anderson, 1985; John & Weitz, 1988; Anderson & Weitz, 1989) and relational governance (e.g. Dwyer et al., 1987; Zaheer & Venkatraman, 1995; Berger, Noorderhaven, & Nooteboom, 1995). With few exceptions, strong support is found for the expected effect of dedicated investments. They increase (perceived) *relational risk* of dependence (hold-up), and this tends to stimulate organizational integration, which confirms the TCE part of our hypotheses. Heide & John (1990) found that dedicated investments also increase the extent of joint action. Further, they find that the supplier's investments in dedicated assets increase the expectations of relationship continuity. This is consistent with both the competence theory and TCE. According to TCE specific investments yield a need for a relationship to last sufficiently long to recoup the dedicated investments. According to the competence perspective, dedicated investments are used to create durable relations for the development of competencies.

Following TCE, one effect of specific investments is switching costs, which yields *dependence*. Heide (1994) uses the replaceability of the firm's existing partner as a measure of the firm's dependence and shows that unilateral dependence undermines opportunities of flexibility. However, he also finds that symmetric and high dependence promotes opportunities of flexibility. In a similar vein, Buchanan (1992) finds that high mutual dependence enhances performance. Some studies on interorganizational exchange also incorporate the concepts of 'total interdependence' and 'interdependence asymmetry'. The former is the sum of both firm's dependence, and the latter is the difference in dependence on the two sides of a dyad. Kumar et al. (1995) show that total interdependence in a channel relationship has a positive effect

on commitment. Further, they find that greater interdependence asymmetry increases conflict and decreases commitment. Geyskens et al. (1996) show that greater total interdependence increases both 'affective' and 'calculative' commitment. Berger et al. (1995) found similar effects on supplier's perceived dependence and supplier's net dependence (excess of own dependence over buyer's dependence). Thus the evidence suggests that while specific assets yield switching costs –which yields dependence, which increases relational risk– dependence may also yield commitment, which reduces relational risk. Therefore, we will test whether specific investments have a dual effect: a positive effect on relational risk, and an indirect negative effect, through a positive effect on commitment.

*Value*, including perspectives for future development, is key in the competence perspective. It is also another source of dependence. To the extent that a partner yields more unique value, in competencies that are difficult to imitate, one becomes more dependent. In fact, the previous indirect negative effect of specific investments on relational risk is likely to operate through value: specific investments increase the unique value to the partner, who thereby becomes more committed, which reduces relational risk. Value is defined as the competencies partners offer each other. Besides productive efficiency, value includes many more dimensions such as developmental capacity, value as a source of learning (innovative capabilities), international presence, and continuity.

The negative effect of dependence on relational risk is supposed to operate through *commitment*. Customer's commitment is defined as the customer's efforts to maintain and continue the relationship (cf. Helper, 1987). This brings it close to loyalty, and hence to trust, interpreted as perceived loyalty. Most empirical studies find strong support for the expected positive effect of trust on 'continuance' commitment (e.g. Anderson & Weitz, 1989; Morgan & Hunt, 1994). Geyskens et al. (1996) find that commitment is greater when total interdependence is higher and that when asymmetry increases, commitment decreases for the less dependent party and increases for the

more dependent party. Nooteboom et al. (1997) find confirmation of the expectation that trust has a negative effect on the perceived probability of relational loss.

*Expectations of the future*, or the ‘shadow of the future’, has an important impact (Macneil, 1974; Heide & Miner, 1992). The supplier’s future perspectives is defined as the supplier’s expected continuation of the relationship with the dedicated customer of the focal dyad at a given point in time (cf. Parkhe, 1993). Heide & Miner (1992) find support for the hypothesis that anticipated open-ended future interaction, which they define as ‘extendedness’, increases the chance of a pattern of cooperative behavior. Parkhe (1993) also showed that cooperative performance is promoted the longer the ‘shadow of the future’. Anderson & Weitz (1989) found that expectations of open-ended interaction between buyers and suppliers have a positive influence on the supplier’s investments in dedicated assets. This is consistent with the theory and experiments on repeated games, which show that greater expectations of relational continuity increase collaboration (Axelrod, 1984; Heide & John, 1990). Hence, future perspectives are expected to have two effects. First, from a competence perspective, they make the partner more attractive, so that it becomes more worthwhile to engage in specific investments. Second, the ‘shadow of the future’ reduces the risk associated with dedicated investments.

### **3.2 The Structural Model**

In our model we explicitly relate economic with non-economic, relational factors. Most of the causal relationships between our constructs have been well documented in the literature. Therefore, we will only briefly discuss our hypotheses with regard to these associations (see Figure 1).

Concerning the determinants and consequences of dedicated investments we hypothesize:-

H1A Supplier’s dedicated investments will have a positive effect on supplier’s dependence.



H1B Supplier's future perspectives will have a positive effect on supplier's dedicated investments.

H1C Customer's value to the supplier will have a positive effect on supplier's dedicated investments.

We propose several determinants of dedicated investments. Firstly, there must be future perspectives, i.e. the perspective of future exchange is needed for the development of competencies to ensure that dedicated assets will be recouped (Hypothesis 1B). A second determinant comes from the competence perspective, where value of the partner is the core concept. The customer's value to the supplier can be defined as all skills, competencies, and capabilities the customer can offer the supplier. The more important the customer is to the supplier, the more incentives the supplier will have to invest in the relationship to make sure that the relationship continues and it maintains access to the customer's resources. This yields Hypothesis 1C.

The hypotheses concerning supplier's value to the customer are as follows:-

H2A Supplier's dedicated investments will have a positive effect on supplier's value to the customer.

H2B Supplier's value to the customer will have a positive effect on customer's dependence.

TCE is certainly correct to argue that dedicated investments create risks of dependence. However, dedicated investments also create value and this may create countervailing dependence. When the supplier makes dedicated investments, he will be better able to perform tasks that are geared to the specific needs of the buyer, and therefore the supplier's value to the customer will increase (Hypothesis 2A). An example of the two-sided effect of dedicated investments, i.e. on supplier dependence and on its value to the customer, is Toyota's customer-supplier just-in-time (JIT) system (Dyer & Ouchi, 1993). For JIT to be in place, customized investments are necessary to be able to realize organizational input (division of labor, cycle times, and

staff training), information systems, plants and other flexible manufacturing systems. These investments are often not readily applicable to other partners. The customized investments, however, also create value because they reduce complexity and costs by eliminating inventories and work in progress. This ensures that there are no unnecessary buffer stocks, distribution facilities or quality inspections. Thus we hypothesize that value created by the supplier for the customer increases the latter's dependence (Hypothesis 2B).

The antecedent and two consequences of customer's commitment are as follows:-

- H3A Customer's dependence will have a positive effect on customer's commitment.
- H3B Customer's commitment will have a positive effect on customer's value to the supplier.
- H3C Customer's commitment will have a positive effect on supplier's future perspectives.

Thus far we have considered risks, safeguards, and the development of competencies. Next, we turn to customer's commitment, i.e. the customer's motivation to continue the relationship with a supplier. Calculative commitment refers to the customer's need to maintain the relationship given the anticipated switching costs associated with leaving (cf. Geyskens et al., 1996). It is the result of the calculation of costs and benefits, including an assessment of the investments made in the relationship and the ability to replace or make up for the foregone investments should the relationship be terminated. Hence, the greater the customer's dependence, the greater the customer's commitment (Hypothesis 3A). As explained by Helper (1987) in her exit-voice approach, customer's commitment refers to all the customer's efforts to work out problems with the supplier rather than ending the relationship. For example, a new supplier may present itself, offering a similar product of equal quality but at a lower price than the customer's current supplier. As a response, a committed customer will offer his current supplier assistance –for example, via specialized technical support teams– to help the current supplier to lower his price and to match his competitor's production performance. Therefore, customer's commitment will contribute to the

customer's value to the supplier (Hypothesis 3B). Finally, we expect the customer's commitment to be related to the supplier's future expectations of the relationship. Customer's commitment is an indicator for the supplier that the customer will not end the relationship in the short run. Therefore, customer's commitment will increase the supplier's future perspectives. This yields Hypothesis 3C.

The hypotheses concerning relational risk are as follows:-

- H4A Customer's commitment will have a negative effect on supplier's uncertainty avoidance.
- H4B Supplier's uncertainty avoidance will have a negative effect on supplier's dedicated investments.
- H4C Supplier's dependence has a positive effect on supplier's uncertainty avoidance.

Customer's commitment indicates that the customer will not engage in opportunistic behavior as soon as the opportunity and an incentive for it arises. In other words, he will engage more in voice than in exit. This increases the willingness of the supplier to accept dependence (Hypothesis 4A). Supplier's uncertainty avoidance refers to the supplier's inclination or desire to avoid risks, in particular hold-up risk. This risk is determined by the degree to which one is dependent, as a result of dedicated investments. Hence, one way of reducing the risk of hold-up is to reduce dedicated investments and thus reduce dependence. This yields Hypothesis 4B. Suppliers dependence increases his perceived relational risk, and hence uncertainty avoidance. This is Hypothesis 4C.

The eleven hypotheses are summarized in Table 1 and together they yield our structural model of long-term supply relationships (see also Figure 1).

TABLE 1  
Overview of the Hypotheses

No.	From Construct	Sign	To Construct
<i>I Dedicated Investments</i>			
H1A	Supplier's dedicated investments	+	Supplier's dependence
H1B	Supplier's future perspectives	+	Supplier's dedicated investments
H1C	Customer's value to supplier	+	Supplier's dedicated investments
<i>II Value of the Partner</i>			
H2A	Supplier's dedicated investments	+	Supplier's value to the customer
H2B	Supplier's value to the customer	+	Customer's dependence
<i>III Commitment</i>			
H3A	Customer's dependence	+	Customer's commitment
H3B	Customer's commitment	+	Customer's value to the supplier
H3C	Customer's commitment	+	Supplier's future perspectives
<i>IV Relational Risk</i>			
H4A	Customer's commitment	–	Supplier's uncertainty avoidance
H4B	Supplier's uncertainty avoidance	–	Supplier's dedicated investments
H4C	Supplier's dependence	+	Supplier's uncertainty avoidance

## 4 RESEARCH METHODOLOGY

This section continues with a discussion of our research methodology, including a review of the data, the measures and the statistical methods.

### 4.1 Data collection

The data used to test our structural model of long-term supply relationships are derived from responses from first-tier component suppliers in the automotive industries of the U.S., Japan and Europe. For details on the sampling framework and response rates, see Appendix A.

The samples are mixed in terms of the suppliers that are involved in relationships with different lengths of duration. The focus of this paper is to explain the nature of durable relationships in an international perspective. The mixed population may bias the results (cf. Dwyer et al., 1987; Moorman et al., 1992; Das & Teng, 2002). Therefore, we included responses from suppliers that have a relationship older than three years. It provided us with detailed information on 553, 450 and 226 long-term supply relationships in the U.S., Japan and Europe respectively.

The data employed in this study have several main advantages. First, they provide very detailed information about the relationship between a supplier and a customer, which enables us to design the constructs we are interested in. Second, many items required the respondent to score on a Likert or a semantic differential type of scale; i.e. many items refer to the perceptions of respondents. Measuring perceptions is increasingly acknowledged as being important because it are often perceptions rather than objective criteria that drive a firm's strategic decision-making process (Noorderhaven, 1995). Third, the data allowed us to compare long-term supply relationships in the U.S., Japan and Europe and by doing so to establish whether the received view on systemic differences between Japanese and Western subcontracting still exist. Fourth, the data concerned the automobile industry, which in all three regions is one of the main industries in terms of its contribution to gross domestic product and employment. Also, the automobile is a complex product to which supply relationships are tremendously important. An average car consists of about 15,000 components, all of which have to be produced, delivered and assembled in order to produce a well-functioning vehicle. As a result, supply does not concern mere commodities. Collaboration on the basis of dedicated investments and congruent competencies is highly relevant.

#### **4.2 Estimation Techniques**

This study follows the two-step approach of LISREL, separating estimates for the measurement models from the structural model (Jöreskog & Sörbom, 1993a, 1993b). Based on the definitions of the constructs we developed multi-item measures for six

latent constructs i.e. for supplier's dependence, customer's dependence, supplier's value, customer's value, customer's commitment, and supplier's uncertainty avoidance. As usual, observed indicators that constitute the items of the survey measure these latent constructs. The other two constructs, supplier's dedicated investments and supplier's future perspectives, are measured by one item. Appendix B provides an overview of our constructs and the corresponding items of the survey.

For the factor-analytic measurement of the latent constructs we used LISREL's maximum likelihood (ML) estimation procedure, based on a correlation matrix of items per construct. The acceptance levels were .30 for the factor-loadings and 2.0 for the estimated t-values. For the structural model we also used LISREL's ML estimation procedure –based on the correlation matrix of the constructs– to obtain the standardized estimates of the parameter coefficients and the estimated t-values. This information is used to test our hypotheses. A hypothesis is confirmed if the estimated path-coefficient is significant and has the hypothesized sign. A t-value larger than 1.28 corresponds to  $p < .10$  (weakly significant); a t-value larger than 1.65 corresponds to  $p < .05$  (moderately significant) and a t-value larger than 2.33 to  $p < .01$  (strongly significant). Furthermore, we used LISREL to calculate three of the most common indicators for the evaluation of the model-fit to the sample data (Boomsma, 1996; Browne & Cudeck, 1992). These model-fit indicators are the goodness-of-fit (GFI) index, the adjusted goodness-of-fit (AGFI) index, and the root mean square error of approximation (RMSEA). For the GFI and AGFI, a value greater than .90 is considered an indication of good fit. For the RMSEA, a value smaller than .08 is considered an indication of good fit.

## **5 RESULTS**

### **5.1 Validation of the Measures**

In all three regions the items for a specific latent construct pass the various criteria i.e. the factor-loadings exceed .30 and the estimates are significant (with t-values  $> 2.0$ ). Table 2 gives the end results for the validation of the constructs.

TABLE 2  
Factor-Loadings for the Constructs (t-values within parentheses)

No.	Construct	Item	USA	Japan	Europe
(1)	(2)	(3)	(4)	(5)	(6)
01	Supplier's Dependence	SD1	.36 (4.25)	.32 (2.74)	.31 (2.36)
		SD2	.41 (6.12)	.34 (2.91)	.57 (5.24)
		SD3	.65 (7.48)	.59 (3.86)	.67 (5.56)
		SD4	.38 (5.83)	.39 (3.24)	.34 (3.84)
02	Customer's Dependence	CD1	.56 (10.18)	.43 (5.50)	.42 (3.72)
		CD2	.56 (10.18)	.43 (5.50)	.42 (3.72)
03	Supplier's Value				
	Relative Skills		.49 (2.52)	.73 (3.46)	.32 (2.03)
		SV1	.63 (8.71)	.70 (6.23)	.70 (6.23)
		SV2	.78 (9.40)	.95 (6.49)	.95 (6.49)
		SV3	.91 (9.67)	.91 (6.49)	.91 (6.49)
	Technical Competencies		.41 (2.32)	.48 (2.68)	.41 (2.11)
		SV4	.43 (4.96)	.35 (3.92)	.35 (3.92)
		SV5	.42 (4.94)	.98 (3.12)	.98 (3.12)
	Innovative Capabilities		.57 (2.24)	.50 (4.34)	.38 (2.09)
		SV6	.58 (5.62)	.35 (5.39)	.35 (5.39)
		SV7	.44 (5.19)	.58 (7.47)	.58 (7.47)
		SV8	.67 (5.64)	.59 (7.48)	.59 (7.48)
04	Customer's Value	CV1	.42 (7.86)	.39 (3.79)	.35 (3.64)
		CV2	.39 (7.36)	.68 (4.45)	.35 (3.71)
		CV3	.67 (11.49)	.42 (4.16)	.55 (4.99)
		CV4	.58 (10.64)	.44 (5.33)	.50 (4.74)
05	Customer's Commitment	CC1	.83 (14.69)	.47 (6.67)	.47 (3.89)
		CC2	.48 (9.07)	.49 (6.87)	.32 (2.94)
		CC3	.46 (8.69)	.30 (4.56)	.35 (3.19)
		CC4	.58 (10.96)	.50 (6.96)	.55 (4.21)
06	Supplier's Uncertainty	SUA1	.67 (14.60)	.84 (20.64)	.73 (11.04)
	Avoidance	SUA2	.67 (14.60)	.84 (20.64)	.73 (11.04)

A special case is the latent construct ‘supplier’s value’. Eight items were selected which were expected to measure this construct. The analysis resulted in three factors which have a clear interpretation: the supplier’s value in terms of his skills (factor 1), innovative capabilities (factor 2), and technical competencies (factor 3). It is striking that this outcome applies to all three regions. This empirically confirms the importance of different dimensions of value in terms of competencies.

Following the satisfactory results for the validation of our variables we added the scale items to obtain composite measures for the six latent constructs. The other two constructs are measured by a single item, i.e. ‘supplier’s dedicated investments’ by the amount of dedicated investments made by the supplier (logarithm scale), and ‘supplier’s future perspectives’ by the number of years the supplier expects the relationship with the customer to continue. Table 3 presents the averages for the eight constructs in the three regions (see Appendix C for the summary statistics and the correlation matrices).

TABLE 3  
Mean Values for the Constructs

No (1)	Construct (2)	U.S. (3)	Japan (4)	Europe (5)
01	Supplier's dedicated investments	14,10	5,92	16,48
02	Supplier's dependence	10,49	11,34	10,57
03	Customer's dependence	8,09	8,21	8,28
04	Supplier's value to customer	25,02	23,41	25,66
05	Customer's value to the supplier	11,22	12,80	11,13
06	Customer's commitment	10,89	11,49	13,77
07	Supplier's future perspectives	7,93	25,37	17,69
08	Supplier's uncertainty avoidance	0,44	1,08	0,38



## 5.2 Comparing the Constructs

In the introductory section of this paper we argued that much of the literature on interorganizational exchange suggests that systemic differences between the three regions exist. Supposedly, this is due to different approaches of supplier relationships, based on deep cultural and institutional differences. From that perspective, it is striking that in Table 3 most averages of the constructs for the three regions are quite close, and the differences that do arise run counter to the expectations. For example, both supplier's and customer's dependence, as well as customer's commitment have similar values in the three regions. This belies the idea that in contrast with Japan, Western companies avoid dependence and commitment in supposedly ad hoc, arms-length transactions. Hence, the data show that in all three regions suppliers are involved in durable relations.

Concerning the observed differences, it is firstly striking that in Japan the average level of dedicated investments is much lower than of the level in the U.S. and Europe (less than a third). From the perspective of durable 'Japanese' buyer-supplier relations in vertically connected 'keiretsu' one would have expected the opposite. The difference is somewhat misleading because Japanese investments are measured in Yen (5.92, logarithm), U.S. investments in dollars (14.10, logarithm) and European investments in a collection of currencies (16.48, logarithm). However, even when we convert these figures into a common currency the same result appears: on average Japanese dedicated investments are much lower than in the U.S. and in Europe.

Secondly, Table 3 shows that customer's commitment in Japan is hardly higher than in the U.S., and lower than in the Europe. This raises questions concerning the supposedly more 'loyal' relations in Japan. Thirdly, again in contrast with the received view, supplier's uncertainty avoidance in the supposedly more 'loyal' Japan is not lower than in the U.S. and Europe, but twice as high. Fourthly, U.S. supplier's value is the highest of the three regions. Finally, the fact that in Japan supplier's future perspectives is clearly highest, followed by Europe, conforms better with the received view. On average, the Japanese suppliers in our sample expect the

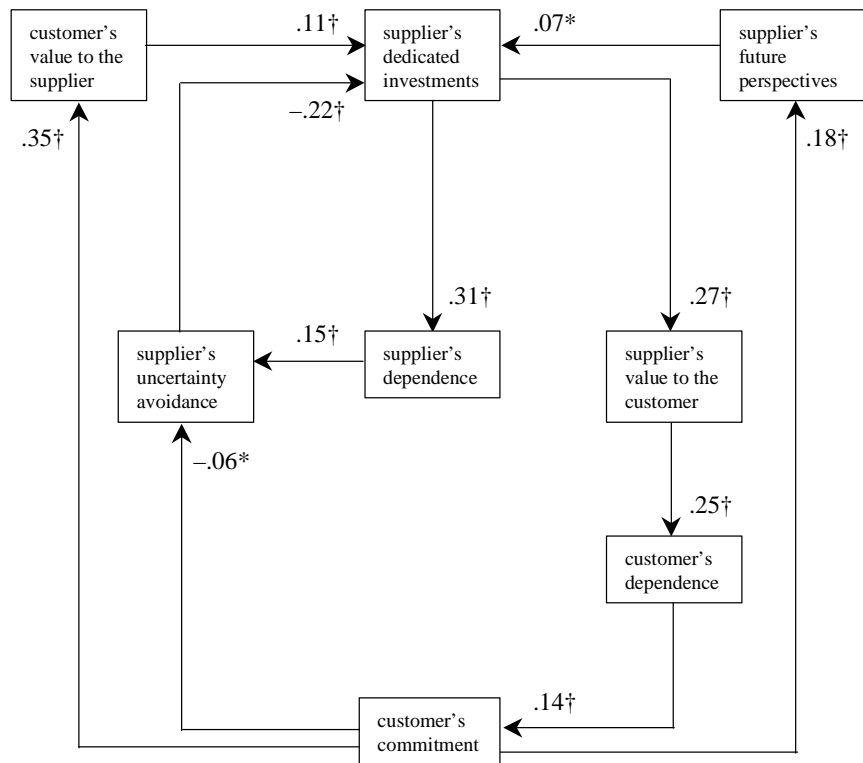
relationship to continue for about 25 years, the U.S. suppliers 8 years, and the European suppliers little over 17 years.

Based on these preliminary results we conclude that while perhaps in the past there might have been great differences in Japanese and Western styles of buyer-supplier relationships, there has been a certain amount of convergence towards a generic model of governance. Hence, not only in Japan but also in the West, buyer-supplier relationships are now characterized –at least in the auto industry– by significant levels of dedicated investments, mutual dependence, and commitment from the automobile producer. Apparently, the West has learned from Japan concerning the benefits of certain durability and mutual dependence in relationships. Having said that, we do see some differences, and to investigate them further we proceed to the analysis of the causal relations between the constructs.

## **5.2 Testing the Structural Model**

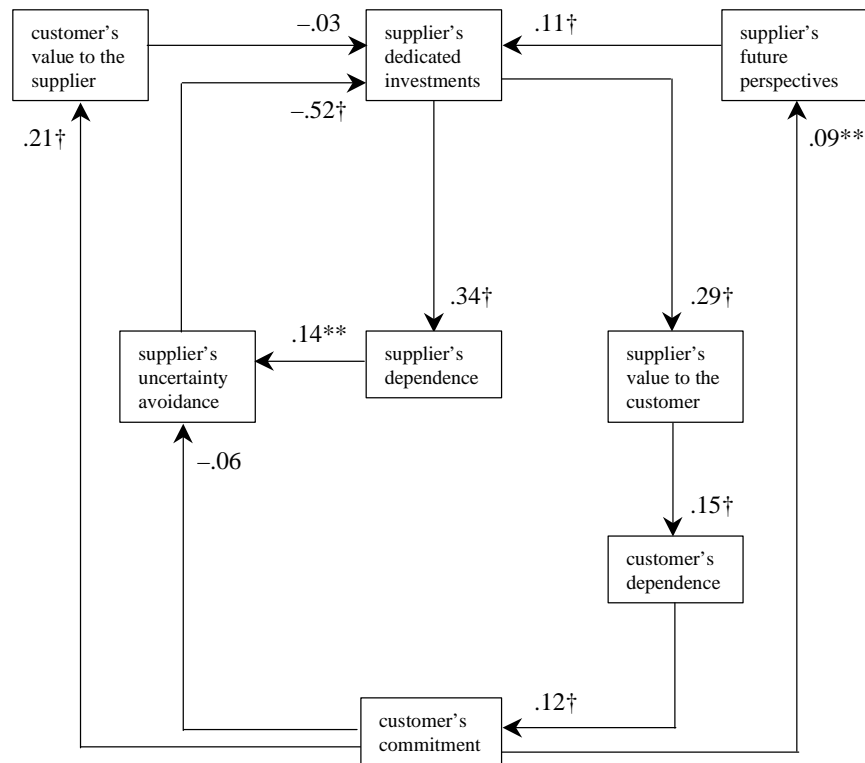
The estimates for our structural model are reported in Figures 2 (U.S.), 3 (Japan) and 4 (Europe). They are also brought together in Table 4. In all three regions, the values of GFI and AGFI exceed the minimum level of .90 and the values of RMSEA are less than the maximum level .08. We therefore conclude that the model fits each of the three samples well.

FIGURE 2  
LISREL Parameter Estimates for the U.S.<sup>a</sup>



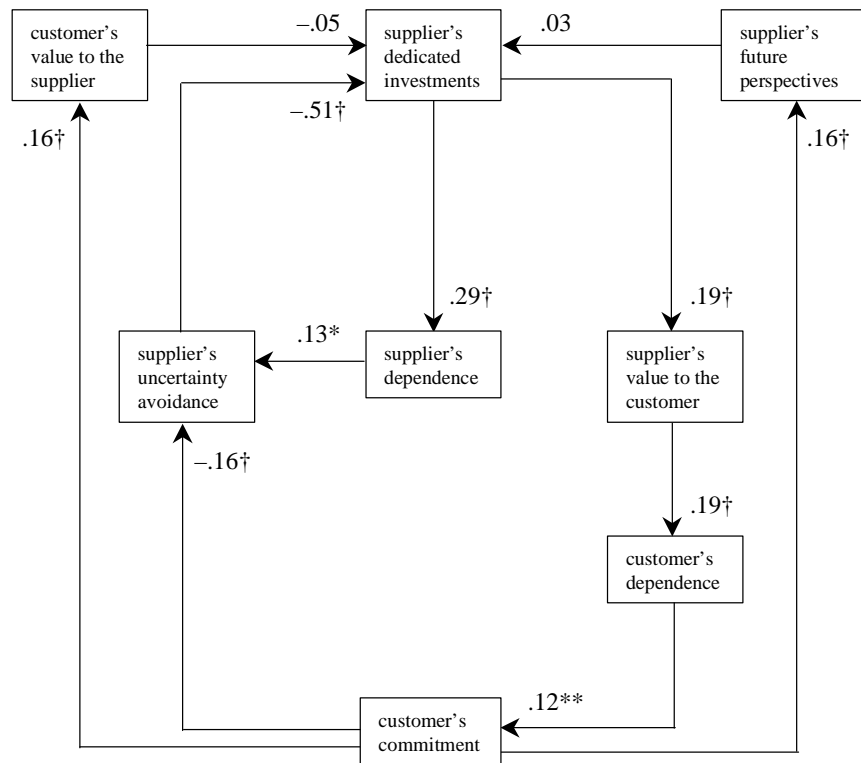
<sup>a</sup> †  $p < .01$ ; \*\*  $p < .05$ ; and \*  $p < .10$

FIGURE 3  
LISREL Parameter Estimates for Japan<sup>a</sup>



<sup>a</sup>  $^{\dagger} p < .01$ ;  $^{**} p < .05$ ;  $^{*} p < .10$

FIGURE 4  
LISREL Parameter Estimates for Europe<sup>a</sup>



<sup>a</sup> †  $p < .01$ ; \*\*  $p < .05$ ; \*  $p < .10$

TABLE 4  
Summary of the Empirical Results (t-values within parentheses)<sup>a</sup>

Hypothesis	U.S. (t-value)	Hyp. Conf.	Japan (t-value)	Hyp. Conf.	Europe (t-value)	Hyp. Conf.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>I Dedicated Investments</b>						
Hypothesis 1A: +	.31† (7.90)	yes	.34† (6.21)	yes	.29† (3.75)	yes
Hypothesis 1B: +	.07* (1.60)	yes	.11† (2.77)	yes	.03 (0.45)	no
Hypothesis 1C: +	.11† (2.56)	yes	-.03 (-.82)	no	-.05 (-.52)	no
<b>II Value of the Partner</b>						
Hypothesis 2A: +	.27† (6.68)	yes	.29† (6.34)	yes	.19† (2.92)	yes
Hypothesis 2B: +	.25† (5.95)	yes	.15† (3.33)	yes	.19† (2.95)	yes
<b>III Commitment</b>						
Hypothesis 3A: +	.14† (3.37)	yes	.12† (2.57)	yes	.12** (1.83)	yes
Hypothesis 3B: +	.35† (8.78)	yes	.21† (4.44)	yes	.16† (2.38)	yes
Hypothesis 3C: +	.18† (4.22)	yes	.09** (1.96)	yes	.16† (2.43)	yes
<b>IV Uncertainty</b>						
Hypothesis 4A: -	-.06* (-1.43)	yes	-.06 (-1.17)	no	-.16† (-2.35)	yes
Hypothesis 4B: -	-.22† (-4.86)	yes	-.52† (-11.57)	yes	-.51† (-8.25)	yes
Hypothesis 4C: +	.15† (3.19)	yes	.14** (2.28)	yes	.13* (1.55)	yes
<b>Model Fit</b>						
N	553		450		226	
GFI	.98		.97		.97	
AGFI	.95		.94		.93	
RMSEA	.07		.07		.06	

<sup>a</sup> † p < .01; \*\* p < .05; \* p < .10

In all regions there is strong support for the hypothesis that uncertainty avoidance has a negative effect on dedicated investments (Hypothesis 4B). One way of reducing the risk of hold-up is to reduce dedicated investments and thus reduce dependence. This, of course, is not a new insight. It confirms part of transaction cost theory thinking.

A newer result is that in all three regions supplier's dedicated investments indeed have the double effect of increasing supplier's dependence (Hypothesis 1A) but also supplier's value to the customer (Hypothesis 2A). In all three regions these effects are strongly significant. This confirms our ideas about the double function of dedicated investments, i.e. they create risks because they increase the supplier's switching costs, but they also create value, which creates mutual dependence, which mitigates risks.

There is strong support in all three regions for the hypothesis that the value of the supplier increases the dependence of the buyer (Hypothesis 2B). In all three regions there is also strong support for two of the hypotheses concerning the role of commitment: customer's dependence increases commitment (Hypothesis 3A), and this contributes to customer's value (Hypothesis 3B) and supplier's future perspectives (Hypothesis 3C). However, concerning the hypothesized negative effect of customer commitment on uncertainty avoidance the evidence is mixed (Hypothesis 4A). It is weakly confirmed in the U.S., strongly confirmed in Europe, and not confirmed in Japan. Apparently, the logic of using dedicated investments to make the customer dependent and thereby to reduce relational risk does not operate in Japan.

Differences between the regions arise in the determinants of dedicated investments. As noted before, in all three regions there is strong support for the negative effect of uncertainty avoidance on dedicated investments (Hypothesis 4B). However, the regions deviate concerning the hypothesized positive effects on dedicated investments of customer value (Hypothesis 1C) and future perspectives (Hypothesis 1B). These are both confirmed only in the U.S., the first strongly (Hypothesis 1C:  $p < .01$ ), and the second weakly (Hypothesis 1B:  $p < .10$ ). In Japan the influence of future perspectives is strongly confirmed, but there is no significant effect of customer's value. This indicates that in the U.S. dedicated investments are strongly oriented towards valuable

partners, while in Japan they are more oriented towards a continuation of the relation. In Europe, neither customer value nor future perspectives seem to be an argument for suppliers to make dedicated investments. We checked whether this lack of effect might be explained by lack of variation of the two variables. We found that the coefficient of variation of customer's value was low in Japan (0.18) relative to the U.S. (0.29) and Europe (0.25). This may explain the lack of effect in Japan but not the lack of effect in the Europe. The coefficient of variation for future perspectives was not less in the Europe (1.69), but, on the contrary, higher than in the US (0.73) and Japan (1.15).

## **6 DISCUSSION**

In the remainder, we first discuss our key contributions and the implications of our findings. Then we review our research limitations and provide suggestions for further research.

### **6.1 Key Contributions and Implications**

This study offers four key contributions. First, our analysis of long-term supply relationships is conducted on the basis of an interdisciplinary approach. We show that perspectives concerning governance (transaction cost economics), competencies (learning and innovation), and social exchange theory can be integrated into a coherent model. By doing so, we accepted the challenge brought forward by Williamson (1999) who proposed that in a regime of rapid innovation –which particularly applies to the automobile industry– studies of organization must include governance as well as competence perspectives. From the competence view we incorporate the idea that nowadays inter-firm relations exist primarily for learning and for the development of competencies. Learning and competence development arise by interaction, in the use of cognitive variety, which requires dedicated investments in mutual understanding. From TCE we use the notions of dedicated investments and the hold-up problem. From social exchange theory we apply the insight that trust is necessary and feasible, and that it can develop in mutual dependence, in growing mutual commitment. Apart from theoretical arguments that we present, our



interdisciplinary approach is also supported by the empirical results of this study. That is, most of the hypothesized causalities between the constructs are significantly confirmed in the U.S., Japan and Europe and the model fits the three different datasets well.

Second, in our structural model we take into account a variety of interlocking, and partly circular, causal relations between different constructs that composite long-term supply relationship. We have intended to unravel and structure the web of economic and relational constructs that in interaction build long-term relationships. Many empirical studies on interorganizational exchange apply regression techniques with one dependent and two or more explanatory variables. These studies tend to ignore interaction effects between constructs. In our opinion, this type of 'unilateral' organization research has matured: this research offers explanations for specific features of interfirm relationships although some overall generalizations can be established (cf. Geyskens, Steenkamp & Kumar, 1998, 1999; Swan, Bowers & Richardson, 1998). To the best of our knowledge, the present paper is one of the first that explicitly addresses interaction effects for the study of long-term supply relationships.

Third, the empirical results challenge the received view that long-term supply relationships are a typically Japanese feature, embedded and developed in a typically Japanese society and for that reason cannot be established in the competitive, low-trust Western worlds of the United States and Europe. The first indication derives from the comparison of the mean values for the constructs (see Table 3). Most of the mean values in the three regions are quite close, and the differences that do arise run counter to the expectations. Based on these results we concluded that while perhaps in the past there might have been great differences in Japanese and Western style of subcontracting relationships, there has been a certain amount of convergence towards a generic model of governance. The second indication for this conclusion derives from the results for empirical tests of the structural model. Many of our hypotheses are significantly confirmed in the U.S., Japan and Europe and the model fits the three datasets well. Hence, we find that the causal structure of long-term supply relationships is more or less the same in the Triad regions. Apparently, in the West,

the car industry has learned from Japan concerning the benefits of a collaborative relationships (provided that in the past systemic differences between the Triad regions existed, that the 'Japanese' model was considered to be superior, and for that reason has been successfully copied by Western firms).

Fourth, we do find some differences, and those may be significant. They can be summed up as follows:-

1. In Japan, the level of dedicated investments is lower than in the West (see Table 3), and they are more based on the expected continuity of the relation, than on the value of the customer.
2. In Japan, customer's commitment –as a result of dependence that results from dedicated investments– is not perceived to reduce relational risk.
3. In the U.S., dedicated investments are more oriented towards valuable partners.
4. In the U.S., future perspectives are the smallest among the three regions, but it does have a weakly significant effect on dedicated investments.
5. In Europe, future perspectives takes an intermediate value and neither customer value nor future perspectives have a significant effect on dedicated investments.

The U.S. case conforms most to the expectations, confirming all hypotheses. The evidence indicates that U.S. suppliers involve in cooperative relations, focused on joint production of added value on the basis of utilizing complementary competencies. However, there still appears to be a difference in the duration of such cooperative relations, and in the scope for suppliers to choose from a variety of potential customers. In our view, this offers advantages. Relations need to be long enough to recoup dedicated investments and to build up cooperation; to achieve mutual understanding, trust and joint development. But relations may also be too long, causing undue rigidity and lack of the variety of relations that is needed for innovation (cf. Nooteboom, 1998). If it were true that in Japan suppliers are more locked into parallel, competing vertical industrial structures (keiretsu), with limited choice across the boundaries of a keiretsu, then the following would follow.

The expected effect of customer value on dedicated investments follows from the opportunity for the best suppliers to choose the most attractive customers –and to engage in more dedicated investments for them– leaving the less attractive customers to the less attractive suppliers. Those firms have less incentive to tie themselves down with dedicated investments, and they prefer to maintain an opportunity to switch to a more attractive customer later. In the Japanese system, with a narrower scope of choice limited by the boundaries of keiretsu, we would expect the effect of customer value to be less. Due to the lock-in effect of keiretsu there is less incentive for suppliers to compete for the most attractive customers by engaging in more dedicated investments. As a result, the average level of dedicated investments is lower. With a limited choice of customers, suppliers can only be enticed to engage more in dedicated investments by offering better conditions in terms of a durable relation, guaranteed by high commitment. This explanation is confirmed by the fact that in Japan the coefficient of variation of customer value (0.18) is less than in the U.S. (0.29). Thus dedicated investments depend only on the expected duration of the relation, i.e. future perspectives, fed by customer commitment. In Japan, dedicated investments are not used to reduce relational risk but rather to confirm long-term commitments inside keiretsu.

Of course what we offer here is only a hypothesis, inferred from the outcomes of this study. It needs independent testing to further validate our interpretation. This is of some importance. If the benefits of durable relations can be obtained without making the relations longer and more rigid than necessary, and maintaining more variety of relations, this may be better from the perspective of innovation. In other words: in the US perhaps a ‘third way’ of relationship management may have been found (cf. Nooteboom, 1998). This ‘third way’ combines the advantages of sufficiently durable relations with the advantages of a more open system with greater variety of relations. It incorporates advantages of higher quality with higher dynamic, innovative efficiency. This is reflected in both the lower U.S. levels of expected duration of relations and the weaker effect of that expectation on the level of dedicated investments. If our interpretation is correct it may well be that the historical situation

has reversed: for the governance of durable relationships Japanese firms may now learn from the Americans. This would entail that Japanese firms need to break down their keiretsu system to allow for more variety and lesser durability of vertical relations.

The results for Europe are less univocally to interpret but nonetheless they offer valuable information. As in the U.S., customer commitment –created by supplier value as a result of dedicated investments– is seen to reduce relational risk. They can neutralize the fact that dedicated investments also increase dependence. However, in contrast with the U.S., customer value does not have an effect on dedicated investments. In contrast with Japan, future perspectives does not have an effect either. In other words, in Europe the management of durable relations takes an intermediate position between the U.S. and Japan. This generally conforms the expectations.

## **6.2 Limitations and Further Research**

A first limitation of our study is the use of cross-sectional data. It would be an advantage to test the causal effects in a longitudinal study in which both the sequencing as well as the timing of effects is studied explicitly. This is interesting because it would allow seeing whether levels of constructs change over time and how this effects the causal structure of a relationship. Trust, for example, is expected to grow gradually, can easily breakdown, but can also be restored again. Commitment grows very fast when a relationship is initiated, and once it is established it is very difficult to breakdown: even when relationships are ended strong feelings of loyalty may continue to exist. In an ideal research setting the perceptions of the same respondents over time would serve as key input. This really would facilitate the analysis of durable relationships in space and time. Such longitudinal studies may apply LISREL (provided that sufficient cases are collected) or other methods e.g. case studies or computer simulation. In either case, the results from the present study may serve as point of departure.

A second limitation is that the data were gathered from only one side of the inter-firm dyad. This precluded any analysis of possible differences in perceptions

between suppliers and their customers about their long-term relationship. Again LISREL can be applied but also a limited number of case studies could be helpful to explore whether differences in perceptions about the relationship exist and how such possible differences should be incorporated in the model.

A third and final limitation is that the results of this study only apply to the automobile industry. Without further testing they cannot be generalized to other industries and/or entire economies. In particular, when we conclude that the U.S. may have learned from the Japanese way of relationship management, and may subsequently have improved on them, the question remains whether that is also the case in other industries. New data collection could benefit from the design and validation of the questionnaires that are used in this study.

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## **APPENDIX A IMVP Automotive Questionnaires**

### **A.1 Data Collection**

The 1993-1994 automotive surveys were part of and financed by the International Motor Vehicle Program (IMVP) of the Massachusetts Institute of Technology (MIT, Cambridge, U.S.). The surveys were mailed to the first-tier suppliers of automobile producers. As many companies supply their customers with several different types of products, and their relationships with their customer differ by product, respondents were asked to answer the survey questions for their most important customer regarding one product which was typical of their company's output and with which they were familiar.

### **A.2 Sampling Framework**

The U.S. survey was mailed to every automotive supplier and automaker division mentioned in the Elm guide to Automotive Sourcing. This guide lists the major first-tier suppliers –both domestic and foreign owned– to manufacturers of cars and light trucks in the United States and Canada. The target respondents were the divisional directors of marketing at independent firms and the divisional business managers or directors of strategic planning at car manufacturer components divisions. Since they commonly take a lead in interfacing with customers, they were deemed the most knowledgeable informants about customers' procurement practices. The U.S. respondents had a wealth of experience, and were thus the single individuals able to answer all of the questions for the customer/product pair they chose. U.S. respondents averaged more than 18 years in the automobile industry and more than 11 years in their companies.

In Japan the survey (in Japanese) was sent out to all members of the Japan Auto Parts Industries Association (JAPIA), to all automotive suppliers named in *Nihon no Jidosha Buhin Kogyo 1992/1993* (Japanese Automotive Parts Industry, published by Auto Trade Journal Co. Inc. and JAPIA, Tokyo, 1992), and to the component divisions of vehicle manufacturers. The latter publication lists all first-tier suppliers

(both domestic and foreign-owned) to the eleven manufacturers of cars and trucks in Japan. In order to maintain consistency with the US sample, the respondents were asked not to respond with respect to heavy trucks and buses. The target respondent in Japan was the director of sales and marketing at independent firms. For member companies of JAPIA, the survey was sent to the main contacts named by JAPIA, many of whom were either chief executives or marketing directors. JAMA (the Japan Auto Manufacturers Association) took responsibility to identify the respondents for the vehicle manufacturer components divisions. The Japanese respondents were generally well experienced: they had worked for 22 years on average at their company.

The European survey was sent out to about 1,600 major automotive suppliers in Western Europe. This sample was compiled from several sources, including trade associations and the major vehicle manufacturers in Europe. The target respondent was the director of sales and marketing at each firm. Here also, respondents were asked not to respond with respect to heavy trucks and buses. The respondents had a wealth of experience: European respondents averaged 16 years in the automobile industry and 8 years with their companies.

### **A.3 Response Rates**

The U.S. and Japanese responses were far above the norm for business surveys. It was 55 percent in North America, 30 percent in Japan (45 percent among JAPIA members). The response rate for Europe was 16 percent: 25 percent among suppliers from the United Kingdom, 24 percent from Germany, 9 percent from France, and 10 percent from Italy. These response rates are after taking into account those firms, which were unreachable (mail sent to them was returned undelivered), and those, which were not eligible to participate in the survey (they were not first-tier suppliers, or they specialized in supplying for heavy trucks and buses).

The European response rate may seem somewhat low. A low response rate is particularly worrisome when one intends to analyze levels of variables. The main aim of this study, however, is to identify causal relationships between variables, and to

study this with LISREL. The issue than is more indirect i.e. sufficient cases is needed to obtain robust LISREL estimates. As a rule of thumb, 20 observations for each (latent) variable included in the (structural) model are needed. Hence, for our structural model with eight variables the European sample is sufficiently large because the number of cases exceeds the minimum number of 160 observations.

With respect to the U.S. and Japan, non-response bias is assessed in several ways. First, the characteristics of those who returned the survey were compared to those of the entire population. On the characteristics of size and location no significant differences are found. Second, the survey respondents were divided into two groups based on response data. The hypothesis is that those who responded only after the second follow-up mailing might have more in common with those who did not respond at all than those who responded early. This test shows no significant differences for early and late respondents on any of the measures reported in Appendix B. The statistical significance in both cases is judged using a one per cent cut-off point. With respect to Europe, a non-response analysis is not available and hence, a non-response bias may exist.

## **APPENDIX B Explanation of the constructs, items and scales**

### **1 Supplier's dedicated investments SUPINV**

Please estimate the total amount of your business unit's investment in equipment to make this product for this customer over the last four years. (Scale: the logarithm of the amount of investments).

### **2 Supplier's dependence SUPDEP**

- SD1 If you were to stop getting these orders from this customer, approximately how much of your investment *for this product* in plant, equipment, and training would you be unlikely to find alternative uses for and have to write off? (A 1-5 scale with 1 = 10% or less; 5 = 90-100%).
- SD2 Please estimate the technical complexity involved in manufacturing the product in 1992. (A 1-5 scale with 1 = fairly simple; 5 = highly complex).
- SD3 Please check the appropriate range for the average piece price of the product in 1992. (A 1-5 scale with 1 = <\$1; 5 = > \$100).
- SD4 Does your business unit have any of the following? (A 1-5 scale with one point for each of the checked opportunities). A marketing office near your customer; a design office near your customer; a facility near your customer to consolidate shipments of your parts for 'Just-in-Time' (JIT) delivery; an engineers resident at your customer's facility.

### **3 Customer's Dependence CUSDEP**

- CD1 Please estimate the number of months it would take your customer to replace your business unit with another supplier. Consider the time required to locate, qualify, train, make investments, test, and develop a working relationship with another firm. Please exclude legal considerations such as the existence of long-term contracts. (A 1-6 scale with 1 = 0; 6 = > 48).
- CD2 What percent of your business unit's sales ends up as original equipment for cars or light trucks? (A 1-6 scale with 1 = 0-10; 6 = 81-100).

#### **4 Supplier's value to the customer SUPVAL**

- SV1 For design engineering. Currently, how would you rate your business unit's skills at making modifications to products or processes? Please compare yourself to other firms in your industry throughout the world. (A 1-5 Likert scale with 1 = significantly below average; 5 = significantly above average).
- SV2 For making incremental process improvements. Currently, how would you rate your business unit's skills at making modifications to products or processes? Please compare yourself to other firms in your industry throughout the world. (A 1-5 Likert scale with 1 = significantly below average; 5 = significantly above average).
- SV3 For implementing entirely new processes. Currently, how would you rate your business unit's skills at making modifications to products or processes? Please compare yourself to other firms in your industry throughout the world. (A 1-5 Likert scale with 1 = significantly below average; 5 = significantly above average).
- SV4 Of the metal cutting machines currently in use at the plant that makes this product, about what percent are CNC? (A 1-5 scale with 1 = 0%; 5 = 76-100%).
- SV5 About how many robots (programmable machines with at least three axes of movement) are in use at the plant? (A 1-5 scale with 1 = 0; 5 = >10).
- SV6 Approximately what percent of the contacts with your customer regarding this product were for 'your business unit providing technical assistance to customer'? (A 1-5 scale with 1 = 0-19; 5 = 80-100).
- SV7 Which range best describes your business unit's R&D as a percent of sales? (A 1-5 scale with 1 = 0%; 5 = >4%).
- SV8 Please check the descriptions which apply to the product development process for your company's product. (A 1-5 scale with 1 = customer took entire responsibility; 5 = your business unit took entire responsibility).

#### **5 Customer's value to the supplier CUSVAL**

- CV1 Over the last four years, what sorts of technical assistance have you received from your customer? (A 1-5 scale with one point for each checked opportunity).



Provided personnel who visited your site to aid in implementing improved procedures (for zero or a nominal charge; or for a fee). Arranged for training of your personnel at their site (for zero or a nominal charge; or for a fee). Provided personnel who worked two weeks or more on your shop floor to improve your processes (for zero or a nominal charge; or for a fee).

- CV2 Approximately what percent of the contacts with your customer regarding this product were for 'customer providing technical assistance to your business unit'? (A 1-5 scale with 1 = 0; 5 = 31-100).
- CV3 The advice our customer gives us is not always helpful. (A 1-5 Likert scale with 1 = strongly agree; 5 = strongly disagree).
- CV4 In dealing with this customer, we have learned much that will help us with other customers. (A 1-5 Likert scale with 1 = strongly disagree; 5 = strongly agree).

## **6 Customer's commitment CUSCOM**

- CC1 How would your customer react if one of your competitors offered a lower price for a product of equal quality? (A 1-5 scale with 1 = switch to competitor as soon as technical feasible; 5 = help you match your competitors' efforts).
- CC2 How would your customer react if your material suppliers raised their prices? (A 1-5 scale with 1 = reduce your business unit's market share or switch to another supplier at end of contract; 5 = provide significant help for your business unit to reduce costs).
- CC3 Suppose your business unit had an idea that would allow you to reduce your costs, but would require your customer to make a slight modification in its procedures. How would your customer react? (A 1-5 scale with 1 = customer does not welcome suggestions that would require modifications in its procedures; 5 = customer would eagerly solicits such suggestions).
- CC4 We can rely on our customer to help us in ways not required by our agreement with them. (A 1-5 Likert scale with 1 = strongly disagree; 5 = strongly agree).

## **7 Supplier's future perspectives SUPFUT**

For how long do you think there is a high probability that your business unit will be supplying this or a similar item to your customer (in years)? (Scale: the number of years).

## **8 Supplier's uncertainty avoidance SUPUNC**

SUA1 If our customer had given us less assurance of continued business for this product, we would definitely have invested less in plant, equipment, and training which could be used to serve only this customer. (A 1-5 Likert scale with 1 = strongly disagree; 5 = strongly agree).

SUA2 If our customer had given us less assurance of continued business for this product, we would definitely have invested less in plant, equipment, and training which could be used to serve either this customer or other customers. (A 1-5 Likert scale with 1 = strongly disagree; 5 = strongly agree).

## APPENDIX C Summary Statistics and Correlation Matrices

Table C.1  
Summary Statistics (standard deviations within parentheses)

No.	Construct	U.S.			Japan			Europe		
		mean	min.	max.	mean	min.	max.	mean	min.	max.
01	Supplier's dedicated investments	14,10 (3,62)	0,00	20,72	5,92 (2,03)	0,00	11,51	16,48 (3,26)	6,91	23,72
02	Supplier's dependence	10,49 (2,54)	4,00	17,00	11,34 (2,46)	5,00	18,00	10,57 (2,65)	5,00	18,00
03	Customer's dependence	8,09 (2,08)	2,00	12,00	8,21 (1,91)	2,00	12,00	8,28 (1,79)	3,00	12,00
04	Supplier's value to customer	25,02 (4,77)	12,00	39,00	23,41 (4,09)	11,00	36,00	25,66 (4,16)	13,00	40,00
05	Customer's value to the supplier	11,22 (3,22)	4,00	19,00	12,80 (2,26)	5,00	19,00	11,13 (2,76)	4,00	17,00
06	Customer's commitment	10,89 (2,94)	4,00	18,00	11,49 (2,25)	5,00	20,00	13,77 (2,84)	4,00	20,00
07	Supplier's future perspectives	7,93 (5,77)	0,00	50,00	25,37 (29,09)	0,00	100,00	17,69 (29,84)	0,00	100,00
08	Supplier's uncertainty avoidance	0,44 (0,15)	0,11	0,83	1,08 (0,55)	0,19	3,47	0,38 (0,15)	0,10	0,87

TABLE C.2  
Correlation Matrix U.S. (below diagonal) and Japan (above diagonal)

No	Construct	01	02	03	04	05	06	07	08
01	Supplier's dedicated investments	1,00	0,28	0,20	0,29	-0,03	-0,01	-0,15	-0,49
02	Supplier's dependence	0,35	1,00	0,34	0,21	0,11	0,05	0,09	-0,05
03	Customer's dependence	0,20	0,40	1,00	0,21	0,06	0,13	0,12	-0,02
04	Supplier's value to the customer	0,27	0,34	0,25	1,00	-0,03	0,01	0,17	-0,23
05	Customer's value to the supplier	0,11	0,10	0,13	0,10	1,00	0,20	0,09	0,01
06	Customer's commitment	0,01	0,04	0,15	0,06	0,35	1,00	0,09	-0,06
07	Supplier's future perspectives	0,08	0,10	0,15	0,08	0,07	0,18	1,00	-0,08
08	Supplier's uncertainty avoidance	-0,17	0,08	0,03	-0,02	0,03	-0,06	-0,02	1,00

TABLE C.3  
Correlation Matrix Europe

No	Construct	01	02	03	04	05	06	07	08
01	Supplier's dedicated investments	1,00							
02	Supplier's dependence	0,23	1,00						
03	Customer's dependence	0,11	0,19	1,00					
04	Supplier's value to the customer	0,19	0,25	0,19	1,00				
05	Customer's value to the supplier	-0,05	-0,01	0,13	0,01	1,00			
06	Customer's commitment	-0,12	0,09	0,12	-0,15	0,16	1,00		
07	Supplier's future perspectives	0,01	0,06	0,06	0,04	0,04	0,16	1,00	
08	Supplier's uncertainty avoidance	-0,48	-0,01	0,01	-0,07	0,01	-0,17	0,02	1,00